

# Maintenance and Monitoring of Habitat Restoration Projects

**USACE approach to establishing Success Criteria  
and ensuring long-term Sustainability**

**Carl Platz, P.E.**

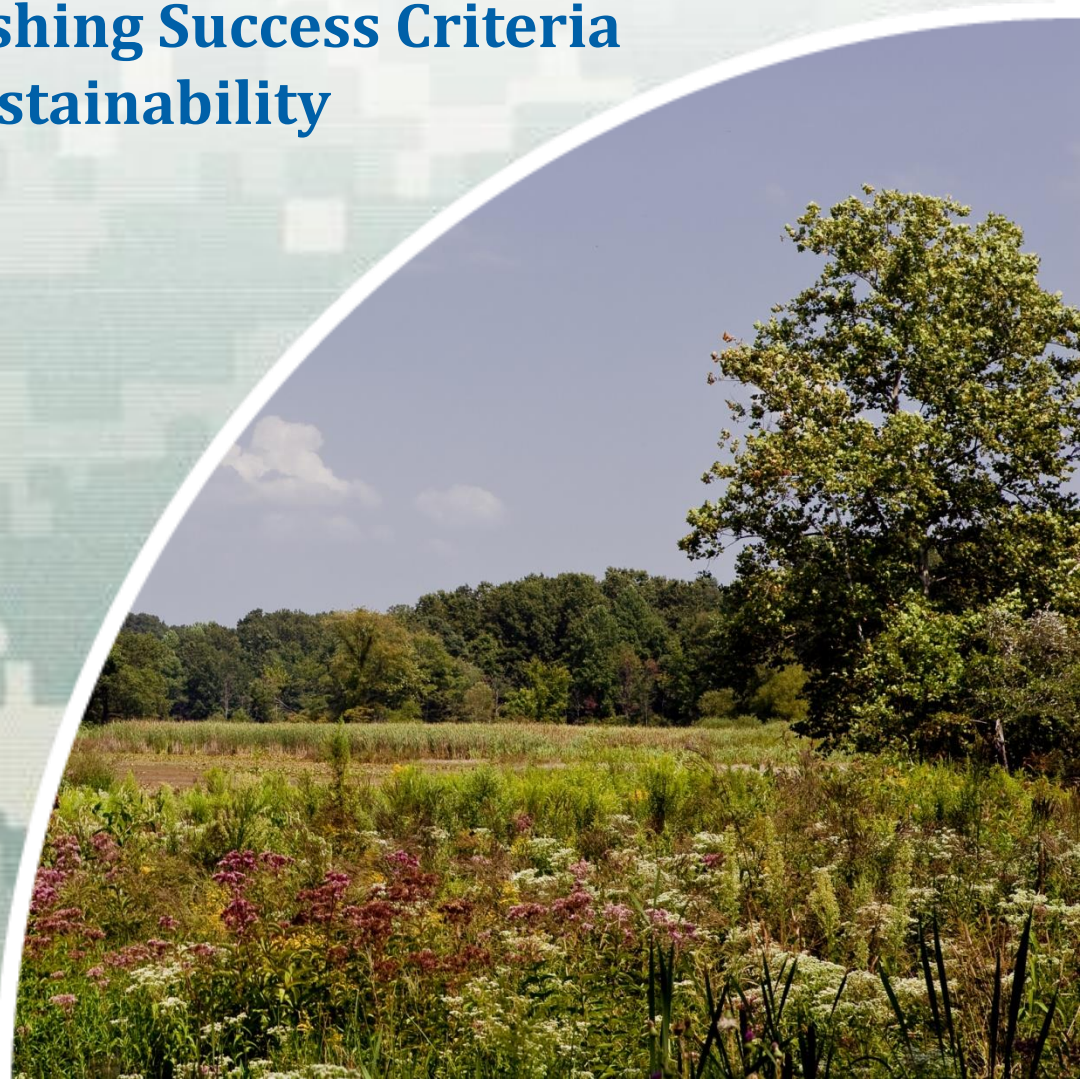
Project Manager  
Detroit District

**Frank Veraldi**

Fish Biologist / Restoration Ecologist  
Chicago District



US Army Corps of Engineers  
**BUILDING STRONG®**



# USACE Ecosystem Implementation (6-Phase Process)

- **Feasibility** (12 –24 months)
- **Design** (4 – 18 months)
- **Construction** (1 to 5 years)
- **Monitoring** (3 to 10 years)
- **Operation & Maintenance** (50 years to perpetuity)
- **Inspection of Completed Works** (perpetuity)

NOTE: Feasibility, Design, Construction and Monitoring phases are cost-shared with identified Non-Federal Sponsor to leverage Federal funding



# USACE Ecosystem Implementation Process

## ➤ **Feasibility Phase** (12 –24 months)

- Typically conducted under GLFER (Sect 506) or CAP (Sect 206) authority
- Completed after execution of legally binding “Feasibility Cost-Share Agreement” with identified Non-Federal Sponsor
- Investigate problems & opportunities and analyze alternatives
- Perform hydraulic modeling; analyze hydrology, geomorphology, plant communities; prepare concept design
- Assign Specific Target Objectives for Restoring the Natural Condition or “Close to as Possible”
  - Qualitative Habitat Evaluation Index, Index of Biotic Integrity, Floristic Quality Assessment
  - Internal and external agency technical review
- Monitoring Plan prepared
  - Outlines Planning Objectives
  - Develops and Defines Success Criteria
- Results in Detailed Project Report (DPR) and Environmental Assessment in accordance with NEPA (including public review, etc.)
- DPR contains conceptual level design and cost estimate
- Undergoes extensive internal USACE approval process



# USACE Ecosystem Implementation Process

## ➤ **Design Phase** (4 – 18 months)

- Initiated after execution of legally binding “Project Partnership Agreement” (PPA)
- Further refine solutions so they can be bid on, constructed, and sustained
- Involves geotechnical investigations, final surveys, and other technical data acquisition as needed
- Finalize Success Criteria based on habitat or fish & wildlife parameters (QHEI, FQA, native species richness)
- Results in plans and specifications so that the project is ready to be bid for construction
- Includes final design and detailed cost estimate
- Undergoes extensive internal USACE quality assurance review and approval process
- Identifies and confirms all Real Estate required to be provided by the NFS for construction and long-term maintenance requirements
  - Real Estate interests to be provided prior to commencing construction activities (per PPA provisions)
  - Value of provided real estate is creditable and can help off-set NFS cash requirement





# USACE Ecosystem Implementation Process

## ➤ **Construction Phase** (1 to 5+ years)

- Implement project design and identified Success Criteria
- Years 1 & 2: “Heavy Work”
- Years 2 – beyond: Establishment of Native Plant Communities
- Adaptive Management Line Items (Contract Options)
- Establishment & Monitoring is more cost effective in the long run than repairing future failures
- Construction Oversight (S&A) by USACE throughout process

## ➤ **Monitoring Phase** (3 to 10 years)

- Ensures success criteria in the beginning stages of O&M phase is being met
- Targets: Feasibility Objectives, Success Criteria and other Parameters that are project specific
- Cost-shared effort often performed by NFS as in-kind effort
- Continues until “ecological success” has been achieved



# USACE Ecosystem Implementation Process

## ➤ **Operation & Maintenance Phase** (50 years to perpetuity)

- A project specific O&M manual is prepared by USACE and provided to the NFS
- Non-Federal sponsor required to maintain project for perpetuity at full non-Federal expense
- Governed by the legally binding Project Partnership Agreement (PPA)
  - ARTICLE VIII - OPERATION, MAINTENANCE, REPAIR, REHABILITATION, AND REPLACEMENT (OMRR&R)

## ➤ **Inspection of Completed Works Phase** (Perpetuity)

- USACE inspections of the completed work may take place annually, if necessary
- Should a failure in quality be identified, the Project Partnership Agreement (PPA) provides the means to ensure quality is restored
- Inspections performed with USACE ICW (O&M) funding
- Ensures the Federal investment is maintained
- Ensures long-term sustainability is achieved



# Example of Sustainable Project

## 63<sup>rd</sup> Street Dune & Fish Habitat, Chicago, IL

- GLFER project
- 4 year construction contract (complete)
- 3 years monitoring (complete)
- O&M by Chicago Park District Natural Areas Program
- Annual inspections by USACE restoration ecologists (ICW)
  - No invasive/non-native species present
  - Federally Threatened Pitcher's Thistle is reproducing
  - Yearly increases in Fish & Wildlife species richness resulting from native plant community quality







Federally Threatened  
Pitcher's Thistle



State Threatened  
Marram Grass



Prickly Pear Cactus



Rattlesnake Master



Dynamically Stable Dune Habitat /  
No Invasive Species



# Example of Sustainable Project

## Eugene Field Park, Chicago, IL

- CAP Section 206 project
- 5 year construction contract (complete)
- 5 years monitoring (in progress)
- O&M by Chicago Park District Natural Areas Program
- Annual inspections by USACE restoration ecologists
  - No invasive/non-native species present
  - Colonization of various species, including muskrat in wetland
  - Yearly increases in Fish & Wildlife species richness resulting from native plant community quality





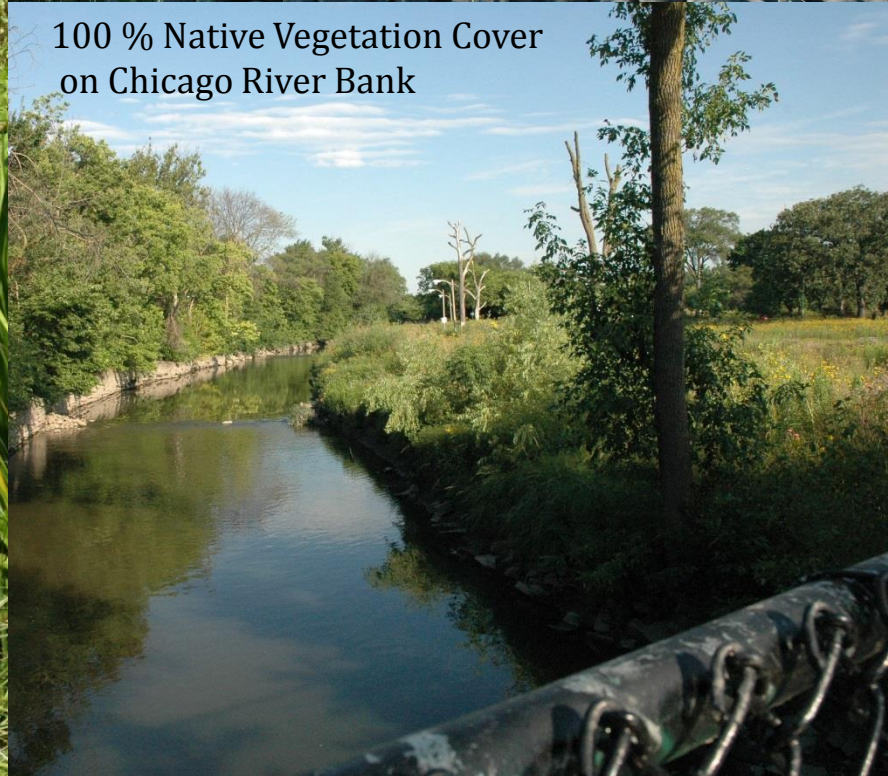
Pickerel Weed, Broad-Fruit Burr-Reed Burr Reed &  
Duck Potato Wetland Pocket Surrounded  
by White Oak Savanna



Fluvial Stone Riffle Habitat  
with American Waterwillow



100 % Native Vegetation Cover  
on Chicago River Bank





# Example of Sustainable Project

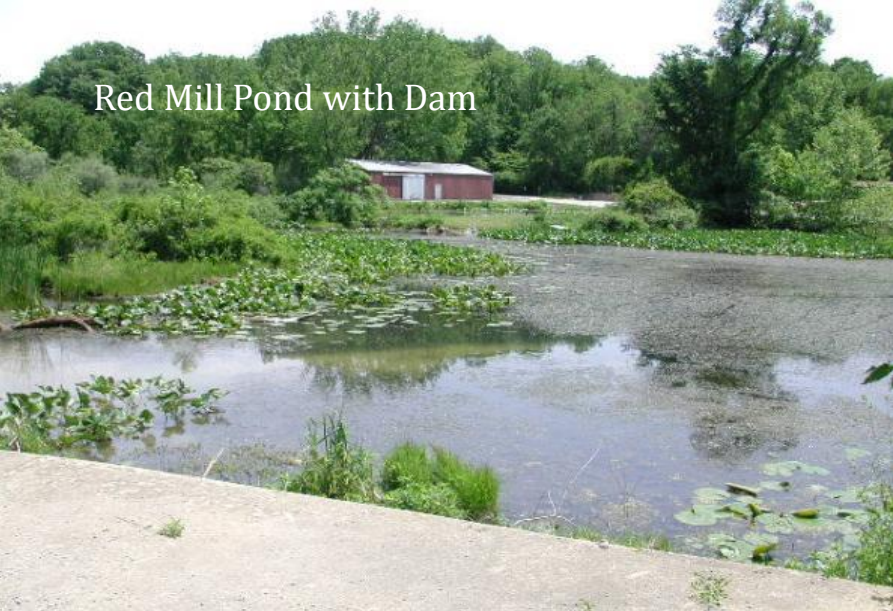
## Red Mill Pond, LaPorte County, IN

- GLFER project
- 3 year construction contract (complete)
- 3 years monitoring (in progress)
- O&M by LaPorte County Parks
- Annual inspections by USACE restoration ecologists (ICW)
  - No invasive/non-native species present
  - Colonization of various native fishes including sensitive Chestnut Lamprey, Lake Chubsucker and Northern Starhead Topminnow
  - Yearly increases in Fish & Wildlife species richness resulting from stream substrate and native plant community quality

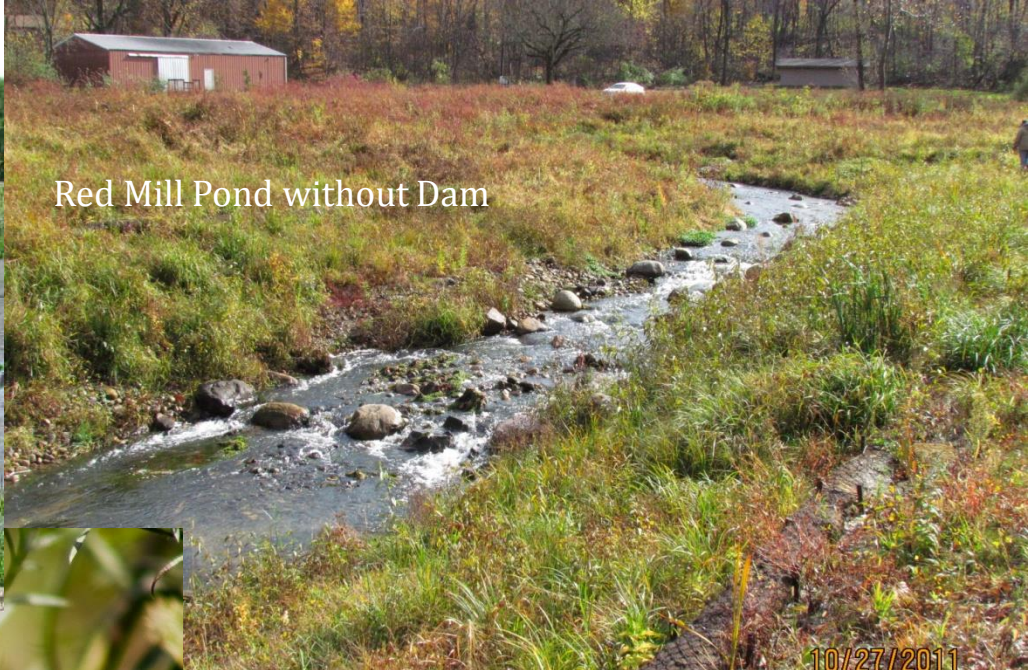




Red Mill Pond with Dam



Red Mill Pond without Dam



10/27/2011

Northern Pearl Eye Butterfly



Restored Stream Channel with  
Natural Substrates & Riparian Meadow





# Example of Sustainable Project

## Frankenmuth Fish Passage, Frankenmuth, MI

- GLFER project
- 1 year construction contract (completed Nov 2015)
- 3-10 years monitoring (to commence in 2016)
- O&M by City of Frankenmuth, MI
- Annual inspections to be scheduled by USACE (ICW)
  - Passage of target species (walleye, etc.) to historically significant spawning habitat on the Cass River above former dam
  - Increase fish diversity and numbers in the Cass River and Saginaw Bay watershed
  - USFWS actively engaged in fish data collection efforts



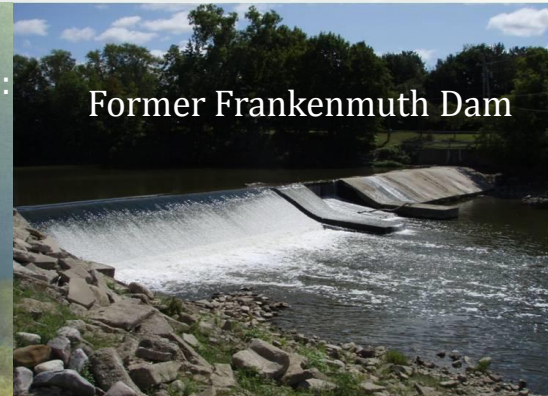




Pre-project conditions  
Cass River



Target Species:  
Walleye



Former Frankenmuth Dam



Rock Ramp Fish Passage  
Cass River, Frankenmuth, MI



# *Questions?*



# *Points of Interest Handout*

## Specific Ecosystem Restoration Objectives

Engineering Regulation 1105-2-100: “Once the problems and opportunities are properly defined, the next task is to define the study planning objectives and the constraints that will guide efforts to solve these problems and achieve these opportunities. Planning objectives are statements that describe the desired results of the planning process by solving the problems and taking advantage of the opportunities identified. The planning objectives must be directly related to the problems and opportunities identified for the study and will be used for the formulation and evaluation of plans. Objectives must be clearly defined and provide information on the effect desired (quantified), the subject of the objective (what will be changed by accomplishing the objective), the location where the expected result will occur, the timing of the effect (when would the effect occur) and the duration of the effect.”

Hegewisch Marsh 506 Sample

### Objective 2 – Eradicate Invasive Species from All Plant Communities

Currently, Hegewisch Marsh wetland, riparian and important buffering habitats are dominated by non-native and invasive plant species. This condition resulted from alteration to the natural hydrogeomorphic landscape, disturbance to native soils, eradication of a native seed bank, prevention of natural processes, and the infestation of native and non-native weedy (ruderal) plants. The domination of plant communities by certain species such as Eastern Cottonwood, European Buckthorn, and Cattail have also caused wetland hydrology to be pumped away in excess of the natural condition via evapotranspiration. This causes native plant and animal species to further disappear. Thus, the changes to the native plant community desired are those that will reestablish a base native plant community matrix that will diversify overtime. These effects would be sustained and increased over the life of the project and optimistically in perpetuity via minor maintenance and, when necessary, additional native plantings by the non-Federal sponsor. This objective seeks to reestablish native plant community richness and structure to support critical wetland and riparian habitats within the Hegewisch Marsh natural area. Improvement is predicted via the increase in quantity (acres of native plant dominance) and increase in quality Future with Project (FQI) of native plant communities.





# *Points of Interest Handout*

## Contract Success Criteria

Sample from USACE Specifications for Native Plantings

The Contractor must conduct establishment activities throughout the period of site preparation for native plant installation and establishment to meet the performance criteria, especially as it relates to planted native species mortality and invasive species control. For purposes of bidding the Contractor is recommended to perform work at the site within all zones at least 8 times during each growing season. The Contractor may have to make additional visits to treat invasive species or perform general site maintenance/establishment activities, at no extra cost to the Contract, but shall meet the performance criteria. If the performance criteria are not met based on formal monitoring by the USACE, Chicago District, recommendations must be made with detailed actions to be taken the following year to meet the performance criteria. The COR has the right to specify the types of remedial actions to be performed in areas that did not meet the performance criteria. Remedial actions must be in the form of replacing plugs, overseeding in underperforming areas, additional control/treatments of invasive species, and/or alternative predator control techniques. All remedial actions must be performed with no further cost to the Contract and must have prior approval by the COR. If survivorship of species planted as plugs is less than the specified amount within the performance criteria below as assessed by the COR, the Contractor shall replant the area to meet or exceed the specified amount the following year at no extra cost to the Contract. In this instance, individual species that exhibit trends of poor performance at the Contract site may be replaced with those species that have exhibited higher survival and growth. All replanting planning and installation must be approved by the COR prior to implementation. If coverage of invasive species is more than the specified amount within the performance criteria for any given year as assessed by the COR, remedial treatments shall be made no less than one week of notice from COR. The Contractor shall then apply remedial treatments to 100% of remaining invasive species. Inspection by the COR of treatment results shall occur within two weeks (or a reasonably specified period based upon herbicide product efficacy) of remedial actions. All remedial actions shall be performed with no further cost to the Contract and shall have prior approval by the COR. If the Contractor fails to comply with the requirements for satisfactory performance, the Contracting Officer has the right to make other arrangements, as it may deem necessary to correct the deficiency, and charge the cost of such remedies to the account of the Contractor. At the end of Year 5 (August - September) or end of contract work, site conditions will be assessed by the USACE, Chicago District for final acceptance. Performance criteria are attached at the end of this section.

Typical Performance Criteria for each year of Construction:

- % Invasive species treated within each zone
- % Invasive species coverage within each zone
- % of seeded native species coverage
- % of seeded native species present
- % of installed plant material alive and viable





# *Points of Interest Handout*

## Contract Warranty & Establishment Periods

“Furnished plant material (live plugs, shrubs, and trees) shall have a warranty for plant growth to be in vigorous growing conditions for a minimum of 12 month period. A minimum 12 calendar month time period for the warranty of plant growth shall be provided regardless of the contract time period. After installation of all plants, the Contractor shall notify the COR and request an inspection. As soon as practicable thereafter the COR will conduct an inspection, at which time all plants in a live, healthy condition will be accepted for payment and the 12 month warranty period will begin. Plants not in a live and healthy condition shall be replaced at the Contractor's expense. It shall be the responsibility of the Contractor to replant as soon as favorable conditions exist. Mortality will be monitored by the COR for the duration of the contract.”



# Points of Interest Handout

## Required Monitoring Plan

### ➤ Directed by Law

Ecosystem restoration monitoring plans, activities, results and cost sharing are governed by Section 2039 of WRDA 2007 Monitoring Ecosystem Restoration:

(a) In General - In conducting a feasibility study for a project (or a component of a project) for ecosystem restoration, the Secretary shall ensure that the recommended project includes, as an integral part of the project, a plan for monitoring the success of the ecosystem restoration.

(b) Monitoring Plan - The monitoring plan shall--

(1) include a description of the monitoring activities to be carried out, the criteria for ecosystem restoration success, and the estimated cost and duration of the monitoring; and

(2) specify that the monitoring shall continue until such time as the Secretary determines that the criteria for ecosystem restoration success will be met.

(c) Cost Share - For a period of 10 years from completion of construction of a project (or a component of a project) for ecosystem restoration, the Secretary shall consider the cost of carrying out the monitoring as a project cost. If the monitoring plan under subsection (b) requires monitoring beyond the 10-year period, the cost of monitoring shall be a non-Federal responsibility.

### ➤ Monitoring Components

- *Component 1 – Structural Sustainability*
- *Component 2 – Biological Response*
- *Component 3 – Planning Goal & Objectives*

### ➤ Monitoring Costs & Schedule

### ➤ Monitoring Responsibilities

### ➤ Adaptive Management



# *Points of Interest Handout*

## Non-Federal Sponsor Requirements for Project Longevity

Excerpt from the Project Partnership Agreement

### ARTICLE VIII - OPERATION, MAINTENANCE, REPAIR, REHABILITATION, AND REPLACEMENT (OMRR&R)

A. Upon receipt of the notification from the District Engineer in accordance with Article II.D. of this Agreement and for so long as the *Project* remains authorized, the Non-Federal Sponsor, pursuant to Article II.E. of this Agreement, shall operate, maintain, repair, rehabilitate, and replace the entire *Project* or *functional portion of the Project*, at no cost to the Government. The Non-Federal Sponsor shall conduct its operation, maintenance, repair, rehabilitation, and replacement responsibilities in a manner compatible with the *Project's* authorized purposes and in accordance with applicable Federal and State laws as provided in Article XI of this Agreement and specific directions prescribed by the Government in the interim or final OMRR&R Manual and any subsequent amendments thereto.

B. The Non-Federal Sponsor hereby gives the Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Non-Federal Sponsor now or hereafter owns or controls for access to the *Project* for the purpose of inspection and, if necessary, for the purpose of completing, operating, maintaining, repairing, rehabilitating, or replacing the *Project*. If an inspection shows that the Non-Federal Sponsor for any reason is failing to perform its obligations under this Agreement, the Government shall send a written notice describing the non-performance to the Non-Federal Sponsor. If, after 30 calendar days from receipt of such written notice by the Government, the Non-Federal Sponsor continues to fail to perform, then the Government shall have the right to enter, at reasonable times and in a reasonable manner, upon property that the Non-Federal Sponsor now or hereafter owns or controls for the purpose of completing, operating, maintaining, repairing, rehabilitating, or replacing the *Project*. No completion, operation, maintenance, repair, rehabilitation, or replacement by the Government shall relieve the Non-Federal Sponsor of responsibility to meet the Non-Federal Sponsor's obligations as set forth in this Agreement, or to preclude the Government from pursuing any other remedy at law or equity to ensure faithful performance pursuant to this Agreement.





# *Points of Interest Handout*

## Real Estate Requirements

Engineering Regulation 405-1-12 See 12-9 b: Determining the Appropriate Interest to Acquire

a. General. It is the policy of USACE to acquire, or to require a non-Federal sponsor to provide, the minimum interest in real property necessary to support a project. The interests described in the following paragraphs have been determined to represent the minimum interest generally required to support the described purposes or features and must be utilized unless otherwise approved as described in subparagraph e of this paragraph. Greater or lesser interests may be appropriate depending upon the purposes of a project or other circumstances relating to project requirements or a particular acquisition.

b. Fee Title. Generally, fee title is required for the following:

- (1) dam sites;
- (2) lock and dam sites;
- (3) disposal and borrow areas required for future maintenance work;
- (4) public access areas;
- (5) recreation; and
- (6) fish and wildlife mitigation lands, ecosystem restoration, and other environmental purposes. However, a lesser, or easement estate, may be appropriate based on the extent of interest required for the operation or requirements of a project.
- (7) disposal areas located on fast land that are required for commercial navigation projects for a harbor or inland harbor.

